

CLAIMS

What is claimed is:

1. A device for joining a first body vessel with a second body vessel, comprising:
an anchor fitting having a flange for engaging the first body vessel, said flange including a plurality of holes formed therethrough;
a cartridge having an aperture and being removably coupled to a proximal end of said anchor fitting, said cartridge including:
a body having a distal end and a plurality of longitudinal channels defined in the body, each longitudinal channel being open on said body at said distal end;
a plurality of drive wires adapted to be received in a respective one of said longitudinal channels of said body;
a plurality of needle anchors adapted to be seated within a respective one of said channels, each of the needle anchors having a pointed distal end; and
a plurality of sutures, wherein each respective suture of said plurality of sutures is secured to one of said needle anchors, threaded through said holes formed in said flange of said anchor fitting and through said aperture of said cartridge.
2. The anastomosis device of claim 1, further comprising a suture lock provided in each of said holes, said suture lock being adapted to permit said sutures to be drawn distally through said holes and to prevent said sutures from being withdrawn proximally through said holes.

3. The anastomosis device of claim 1, wherein said flange includes a plurality of anchoring members formed along a proximal surface thereof for engaging a body vessel.

4. The anastomosis device of claim 1, further comprising a hub disposed on said body and arranged for engaging said drive wires, said drive wires being displaced distally by distal movement of said drive wires.

5. The anastomosis device of claim 1, wherein said anchor fitting is made of a bioabsorbable material.

6. The anastomosis device of claim 1, wherein each of said plurality of needle anchors is made of a bioabsorbable material.

7. The anastomosis device of claim 1, wherein each of said plurality of sutures is made of a bioabsorbable material.

8. An anastomosis device, comprising:
a cartridge having an aperture and having a plurality of needle anchors slidably disposed in a plurality of channels formed in said cartridge and a pusher assembly adapted to push each of said plurality of needle anchors out of said channels of said cartridge;

an anchor fitting removably coupled to a distal end of said cartridge, said anchor fitting including a flange having a plurality of holes, wherein each of said plurality of holes includes a

suture lock adapted to permit a suture to be drawn distally through each of said plurality of holes and to prevent said sutures from being drawn proximally through each of said plurality of holes; and

a plurality of sutures passing through a respective hole of said plurality of holes and secured to a respective needle anchor, and extending through said aperture of said cartridge.

9. The anastomosis device of claim 8, wherein said cartridge further comprises:
a body having an enlarged distal end and a plurality of longitudinal channels, wherein each longitudinal channel terminates in an angled channel.

10. The anastomosis device of claim 9, wherein said pusher assembly further comprises:

a hub adapted to be received on said body, said hub including a flange formed at a proximal end thereof; and

a plurality of drive wires received in a respective one of said longitudinal channels, each drive wire terminating in an angled distal tip corresponding to said angled channels, said drive wires being disposed adjacent said hub so that distal movement of said hub moves said drive wires distally.

11. The anastomosis device of claim 10, wherein said pusher assembly further comprises:

a compression spring disposed around said central shaft and between said flange of said

hub and a distal end of said body.

12. The anastomosis device of claim 10, wherein each of said needle anchors is adapted to be seated on a respective angled distal tip of said plurality of drive wires, wherein a distal movement of said hub along said central shaft drives said plurality of angled distal tips against said needle anchors seated thereon and expels said needle anchors from said channels.

13. The anastomosis device of claim 12, wherein said cartridge includes a cover for enclosing said body and said pusher assembly therein, said cover includes a proximal head
) arranged for engagement by an instrument.

14. The anastomosis device of claim 8, wherein said anchor fitting is made of a bio-absorbable material.

5 15. The anastomosis device of claim 8, wherein each of said needle anchors is made from a bio-absorbable material.

16. The anastomosis device of claim 8, wherein each of said sutures is made from a bio-absorbable material.

0 17. The anastomosis device of claim 8, wherein said flange of said anchor fitting includes a plurality of anchoring members formed on a proximal surface thereof.

18. An anastomosis device, comprising:

a cartridge having a plurality of needle anchors retained therein and a pusher assembly slidably disposed within said cartridge, said pusher assembly being arranged to engage each needle anchor and to deploy said plurality of needle anchors out of said cartridge by moving said pusher assembly distally within said cartridge;

an anchor fitting for engaging a body vessel including an annular sleeve operatively coupled to a distal end of said cartridge and a flange formed on a distal end of said annular sleeve, said flange including a plurality of holes formed therein with each hole having a suture lock; and

a plurality of sutures, wherein a single suture is secured to a respective needle anchor and extends through a respective hole in said flange of said anchor fitting, and proximally through said annular sleeve of said anchor fitting, whereby when said cartridge is separated from said anchor fitting, said sutures are drawn proximally through said anchor fitting thereby drawing said needle anchors toward said anchor fitting.

19. The anastomosis device of claim 17, wherein said anchor fitting further comprises a body and an enlarged distal end; a plurality of longitudinal channels for receiving said needle anchors.

20. The anastomosis device of claim 19, wherein said longitudinal channels include distally angled channels formed in said enlarged distal end for receiving said needle anchors

therein.

21. The anastomosis device of claim 20, wherein said pusher assembly further comprises a hub slidably received on said body and a plurality of drive wires wherein each of said drive wires is configured and adapted to be received in a respective one of said longitudinal channels of said body.

22. The anastomosis device of claim 21, wherein said anchor fitting further comprises a compression spring disposed about said central shaft and said drive wires and between said hub of said pusher assembly and a proximal surface of said body.

23. The anastomosis device of claim 22, wherein said cartridge further comprises a cover configured and adapted to enclose said central shaft and said pusher assembly therein, said cover including a proximal head.

24. The anastomosis device of claim 19, wherein said flange of said anchor fitting includes a plurality of anchoring members formed on a proximal surface thereof.

25. The anastomosis device of claim 19, wherein said suture lock is configured and adapted to permit said sutures to be drawn distally through said holes formed in said flange and to prevent said sutures from being withdrawn proximally through said holes.

26. A method of approximating a first body vessel with a second body vessel, comprising:

- inserting an anchor fitting of an anastomosis device into the first body vessel;
- passing an instrument into the second body vessel;
- coupling the instrument to the anastomosis device;
- disposing the anastomosis device within the second body vessel so that needle anchors of the anastomosis device are within the second body vessel;
- deploying the needle anchors from the anastomosis device into the second body vessel;

and

- withdrawing the sutures proximally, the sutures being attached to the needle anchors, and threaded through the anchor fitting, so that the needle anchors and the anchor fitting are moved toward one another.

27. The method according to claim 26, further comprising the steps of:

- withdrawing the instrument thereby separating the anchor fitting from the device and
- tightening the anastomosis by drawing the sutures through an annular sleeve of the anchor fitting.

28. An anastomosis device, comprising:

- an anchor fitting having a collar and a flange extending radially outward therefrom, the flange includes a plurality of opening formed therein, wherein each opening includes a suture lock configured and adapted to permit unidirectional passage of a suture therethrough;
- a cartridge removably coupled to a proximal end of the fitting, the cartridge including:

a body having a plurality of substantially longitudinally oriented channels with a distal end of each channel terminating in a radially angled channel;

a pusher having a central bore and a hub slidably coupled thereto;

a plurality of drive wires operatively coupled to the hub, each drive wire being configured and adapted to be received in a respective longitudinal channel and having a distal end terminating in a tip configured and adapted to be received in a respective radially angled channel of the body; and

a cover slidably disposed about the body and the pusher;

a plurality of needle anchors configured and adapted to be seated within a respective one of the radially angled channels of the body, each needle anchor being provided with means for coupling to a distal end of a respective drive wire; and

a plurality of sutures, wherein suture is secured to an outer surface of a respective needle anchor, threaded through the openings holes formed in the flange of the anchor fitting, through the collar of the anchor fitting and anchored to an inner surface of the cartridge.